

# Texas Community Doubles Water Supply by Lining Failed Reservoir



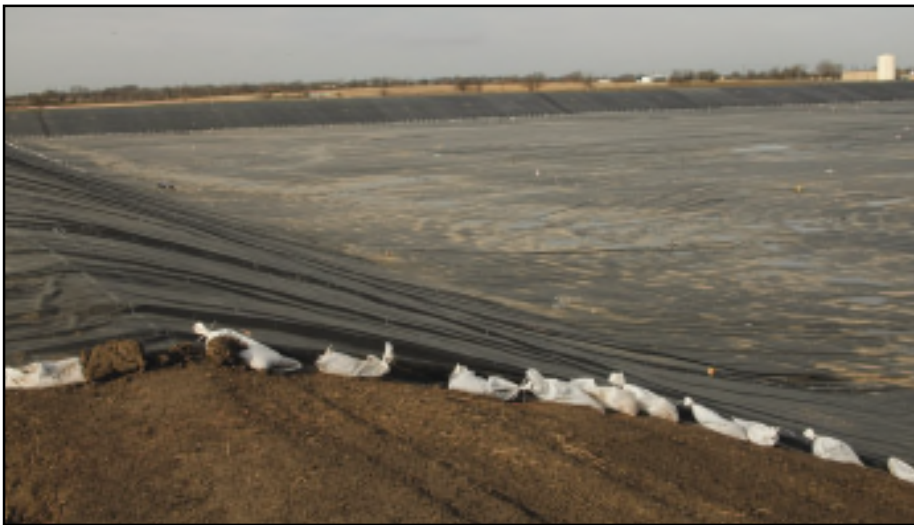
A 45-acre water reservoir in Robinson, Texas stood empty for 17 years due to failure of the existing clay liner. Today, the reservoir is fully operational and is meeting the increasing water demands of this rapidly growing community thanks to the installation of a high quality EPDM geomembrane.

In 1991, two 45-acre reservoirs were dug side-by-side on the outskirts of Robinson, which is located just southeast

of Waco, Texas. Both were clay lined and designed to hold water pumped in from the Brazos River about four miles away. The reservoirs were constructed to serve as holding reservoirs before the water was pumped to a nearby treatment plant and then sent into Robinson. Water from the treatment plant serves the water consumption needs of a large percentage of Robinson's population. The remaining demand is met by the use of well water.

Following the initial filling of the

reservoirs in 1991, one performed well and served the community's needs, while the other failed right from the start—it never held water. In 2002, engineers determined that the likely cause of the water leakage was a fissure that may have formed in the clay during the time the reservoir stood empty before it was filled. The water, they suspect, found a way down through the fissure as well as other sand or gravel veins under the reservoir floor.



Each EPDM panel seam was prepared with a primer and allowed to flash off before putting down Firestone QuickSeam™ Tape and rolling it out to ensure a watertight seam. Pipe boots were also installed, where necessary, and a batten strip was mechanically attached around a piece of equipment that sits on the reservoir floor to measure water depth. A skid steer was outfitted with a spreader bar and the geotextile fabric was unrolled by hand and unfolded in slightly overlapping sections down the 3:1 slopes. As each section was finished, another crew followed with the EPDM panels using the same system for unrolling the 50-foot by 200-foot panels.

Although an attempt was made to repair the clay liner by bringing in new clay and repacking it, the reservoir still would not hold water.

“We got by for a long time being able to keep up with demand with just one reservoir, but our area has experienced a tremendous amount of growth in recent years,” said Greg Hobbs, water utilities director for the city of Robinson. “As Robinson continued to grow, it became increasingly important to get the second reservoir up and running so we would have the extra water available to us.”

Hobbs continued, “A major problem with having only one reservoir operable was that we couldn’t run water to the plant and run the river pump at the same time. We had to run the plant during the week and then find times on the weekends or at night to refill the reservoir using the river pump. We knew that having the second reservoir in operating condition would give us much greater flexibility in our operations.”

#### EPDM Geomembrane Solution

In 2007, city officials determined that they had to find a way to make the second reservoir watertight in order to keep up with increasing water demand. They consulted with their engineering firm of record, Lockwood, Andrews and Newman, in Waco, to find a solution. The firm studied the available options and concluded that the best solution was to line the reservoir with a geomembrane lining system.

A few different products were considered, including RPP, HDPE and EPDM. Based on the product characteristics that were most important for this application, including ease of installation, membrane flexibility, puncture resistance and long-term performance, Lockwood, Andrews and Newman specified a PondGard™ EPDM Geomembrane System from Firestone Specialty Products Company, Indianapolis.

“City officials were unfamiliar with geomembrane lining systems, so it was very important that our recommendation ensured a long-term solution,” said Mitch Davison, project engineer, Lockwood, Andrews and Newman. “This system was definitely the best choice given the

unique challenges of this application.”

One challenge was to design a system to address wave impact and the potential for erosion or embankment failure, according to Davison. “Embankment erosion was a problem with the adjacent reservoir and its clay liner,” he said. “With a large, open body of water like that, the waves can cause significant erosion problems. Because this water is being held for treatment, the sediment that results from the wave action definitely affects the water quality.”

**“A major problem with having only one reservoir operable was that we couldn’t run water to the plant and run the river pump at the same time. We had to run the plant during the week and then find times on the weekends or at night to refill the reservoir using the river pump.”**

**Lining System Installation**

Knife River Corp., Waco, served as general contractor on the project, and Geosynthetics Inc. (GSI), Waukesha, Wisconsin, installed the liner. The first step was to clear the reservoir floor of trees and other vegetation that had grown up over the many years during which it had stood empty. Following the removal of all debris, Knife River graded the entire surface area of the reservoir.

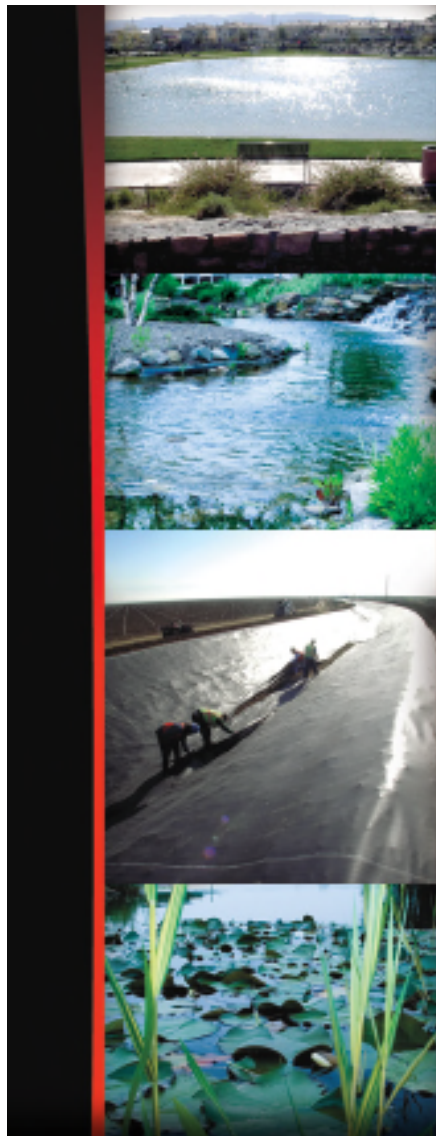
On January 28, 2008, GSI began the lining system installation. The crew started by installing a non-woven geotextile fabric underlayment around the entire perimeter of the reservoir from the trench at surface level down to 10 feet out from the slope toe, according to Dan Vogt, field superintendent for GSI. A skid steer was outfitted with a spreader bar and the geotextile fabric was unrolled by hand and unfolded in slightly overlapping sections down the 3:1 slopes. As each section was finished, another crew fol-

lowed with the EPDM panels using the same system for unrolling the 50-foot by 200-foot panels. The panels were installed over the underlayment fabric as well as the reservoir floor.

Each EPDM panel seam was prepared with a primer and allowed to flash off before putting down Firestone QuickSeam™ Tape and rolling it out to ensure a watertight seam. Pipe boots were also installed, where necessary, and a batten strip was mechanically attached around a piece of equipment that sits on the reservoir floor to measure water depth.

GSI completed the lining system installation in late February 2008 following 17 days of good weather deployment. A crew of 16 technicians installed an average of 119,000 square feet of membrane each day—and as much as 300,000 square feet on a single day—for a total of 2.031 million square feet of EPDM geomembrane. Firestone issued a 20-year material warranty following inspection.

By early April, the city of Robinson had completely filled the reservoir with more than 214 million gallons of water, according to Hobbs.



**Firestone**  
**SPECIALTY PRODUCTS**

**THE LEADER IN LINING**

To ensure the life and longevity of your water feature project, choose a name you can trust.

**Specializing in:**

Commercial & Residential Water Features

Golf Course Ponds & Lakes

Streams & Waterfalls

Reservoirs & Canals

Constructed Wetlands

Stormwater Management Solutions



250 West 96th Street | Indianapolis, IN 46260 | T 800-428-4442 | F 317-575-7002 | www.firestonesp.com/lw1



An unexpected, yet welcomed, result of the project is that the city of Robinson has been able to cut costs by reducing chemicals used to treat the water at the plant.

**Installation Success**

“We’re very pleased with the outcome of this project,” Hobbs stated. “The water in the lined reservoir is better quality than we’ve seen in a few years as far as the concentration of the constituents. The water is very clean, and remains clean because there is no clay sediment.” An unexpected, yet welcomed, result is that the city of Robinson has been able to cut costs by reducing chemicals used to treat the water at the plant.

Having the second reservoir up and running means that the city will be able to meet the water needs of the growing community for many years to come. It also means greater flexibility in operations. “The addition of this second reservoir allows us to pump water from the river without impacting plant operations. Prior to lining our second reservoir we were very limited during crucial summer months on opportunities to refill the one reservoir. Now, we can treat water from either reservoir and at the

same time pump water from the river to maintain adequate water levels,” Hobbs said. “It has doubled our water capacity and has eased our operational burdens significantly.”

**A crew of 16 technicians installed an average of 119,000 square feet of membrane each day—and as much as 300,000 square feet on a single day—for a total of 2.031 million square feet of EPDM geomembrane.**

GSI is also pleased with the project results. “This was one of the largest installations we’ve ever completed,” said John Tenhover, project manager. “Firestone’s EPDM Geomembrane

System proved to be an excellent choice because it enabled us to cover a lot of ground very quickly, which was necessary due to rain and strong winds that shut the project down on several days. The EPDM panels also provide the flexibility necessary to conform to any uneven areas in the subgrade.” The ability to get the entire geomembrane system, including all accessories, from a single manufacturer also helped to expedite the installation.

Engineer Mitch Davison is confident that he specified the right product for the job. “The membrane is performing up to expectations and has yielded some unanticipated positive results,” he stated. “Everyone’s happy.” **L&W**

*For more information, contact Bill Johnson, Field Sales Engineer for Firestone Specialty Products, (800)428-4442.*